DOCUMENT RESUME

ED 052 048 SE 012 008

AUTHOR	Kraft, Thomas L.; Miloy, Leatha
TITLE	Let's Talk About You and Sharks, American Oceanography Special Educational Newsletter.
INSTITUTION	Ameican Society for Oceanography, Washington, D.C.
PUB DATE	71
NOTE	8p.
AVAILABLE FROM	American Society for Oceanography, 1900 "L" Street, N.W., Washington, D.C. 20036
JOURNAL CIT	American Oceanography; v5 n5 1971
EDRS PRICE	EDRS Price MF-$0.65 HC-$3.29
DESCRIPTORS	*Instructional Materials, Junior High School Students, Marine Biology, Newsletters, *Oceanology, Periodicals, *Safety Education, Secondary School Students, *Water Resources

ABSTRACT

This special educational newsletter of the American Society for Oceanography presents information on marine oriented subjects, primarily for reading by junior high and secondary school students. Major articles consider the habits and stinging effects of sharks, jelly fish, and sting rays, and what one should do if stung by these fish while swimming. Additional feature articles for the summer season examine the presence and dangers of rip tides or currents and pleasure boating rules and safety. Other articles discuss treatment for drowning, use of a spear for fishing, the implications of using the deep ocean for disposal of organic wastes, hyperbaric medicine, catfish, and treasure hunting on the shore and at sea. (BL)

ED052048

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION
THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL OFFICE OF EDUCATION POSITION OR POLICY

JUN 1 1 1971

SPECIAL EDUCATIONAL NEWSLETTER

American Oceanography

PUBLICATION OF AMERICAN SOCIETY FOR OCEANOGRAPHY

1900 "L" St. N. W.
WASHINGTON, D. C. 20036
(202) 296-1647

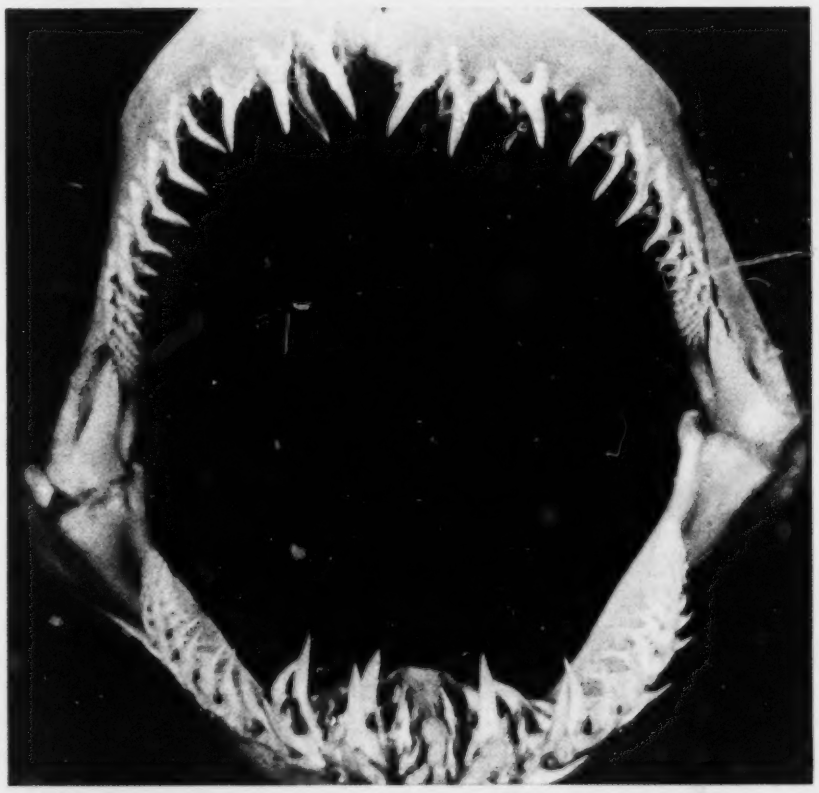
LET'S TALK ABOUT YOU AND SHARKS

If you plan to swim, dive, surf, or fish in the oceans this summer you'll be in shark country. Records show about 100 unprovoked shark attacks can be expected this summer if it is a typical summer. Perhaps 50 people will die. If we examine the records we can guess some additional data on the attacks. On the East Coast, most attacks will occur from mid to later afternoon. Off California, the attacks can be expected a few hours earlier. In the Bahamas, the sharks will attack all day long. There will be as many attacks within 50 feet of the shore as there are in the open sea. The greatest percentage will be in waist deep water or within 5 feet of the surface. This means that most attacks will be on swimmers.

What about the shark?

Here are some facts and opinions based on current research and a review of the records of shark sightings, attacks, and captures. Much of the information comes from *The Sharks Around Us,* by R. D. Shocik.

1. There are about 250 species of sharks. Somewhere between 30 and 50 are considered dangerous. When in doubt, assume all are dangerous.
2. Full grown sharks can be as small as 2 feet or as large as 60 feet. The female will generally grow larger than the male. All sizes should be respected. Size and ferocity don't correlate.
3. Sharks are found in all oceans and all depths (from 2 feet to 17,000 feet). They can travel thousands of miles but tend to adjust to a specific level of salinity.
4. Sharks are extremely intelligent, can see, hear, and smell almost without equal in nearly all water and light conditions. Even in brackish water, they can operate well, once adjusted.
5. Some sharks will eat dead or fresh meat and others only fresh meat. They will eat other sharks occasionally. The Tiger and White sharks will eat about anything they can get in their mouth, such as buoys, poles, flags, etc. Many sharks even relish shark repellants as a snack.
6. You cannot always spot a shark by a dorsal fin since many travel below the surface level. The presence of Ramoras or pilot fish are a good sign of nearby sharks. The presence of porpoises is no comfort. If no porpoise pups are present, the porpoises and sharks have been found to ignore each other and share the same water.
7. Sharks show no preference for dark or light skin on divers.
8. Some sharks travel in schools; others do not. Young sharks will tend to stay together. In the mature sharks, the females will move together around mating season. Otherwise, they tend to go their separate ways.
9. Most spears will not penetrate the hide of the shark. A 45 caliber shell is recommended. The most vulnerable part of the shark is the brain stem on the top of his head. Power spear heads need to be 45 caliber but killing the shark should be a last resort because it will attract others. *(Continued on Page 2)*



Jaw of Sand Shark

* * * * *

In The Good 'Ol Summer Time

It's that time again and more than ever, people seem to need a vacation. This year the oceans will host millions of Americans and provide recreation in abundance. We have two concerns. As you enjoy our most precious natural resource — water, be cautious not to leave an indelible mark. There are two ways you can do this. First, you can use the lakes and oceans as a garbage can. Second, you can kill yourself and others. We are presenting this special issue for all who are about to go to the sea. Read the words, share them with others, remember the rules of safety, and come back home alive and well. Have an especially good summer and do your share in preserving the lakes, seashores, and seas.

SE 012 008

American Oceanography

PUBLICATION OF
THE AMERICAN SOCIETY FOR OCEANOGRAPHY
A NON-PROFIT TAX EXEMPT ORGANIZATION
1900 "L" St. N.W. • WASHINGTON, D.C. 20036 • (202) 296-1847
SPECIAL EDITORS ..... DR. THOMAS L. KRAFT AND LEATHA MILOY
ASSOCIATE EDITOR ..... J. V. BURNHAM

Treatment for Drowning

This, along with the other articles in the Newsletter are presented to help you understand the risks and proper actions to take in emergencies. We are not trying to frighten anyone. Read these to help your understanding. When you end up in an emergency, a simple rule can save your life.

Each year approximately 7,000 people drown in this country. Not enough attempts are made to resuscitate the victims. We would assume that everyone knows about mouth-to-mouth resuscitation. Let's then understand what is drowning and how we can handle the emergency.

Drowning

There is more than one type of drowning but we will talk about the type when your lungs fill with water, or "wet drowning". Dr. Douglas E. Williamson presented an excellent description of the physiology and the treatment of drowning in the Bulletin of the Florida Skin Divers Association. We borrow his words and thoughts in the following paragraphs. When the lungs fill with fresh water, rapid blood dilution occurs in about two minutes. Next comes hemolysis and the levels of sodium, calcium, chloride, and proteins drop. This is usually followed by rapid, irregular contractions of the heart muscle. The swollen blood volume can lead next to fulminating, pulmonary edema and subsequent heart failure. When the lungs fill with seawater, a rapid hemoconcentration occurs. Water diffusion between blood and lungs then produces pulmonary edema. There is, in this case, a reduced volume of blood and subsequently hematogenic shock, hypotension, bradycardia, circulatory collapse, and death.

Treatment

If the drowning victim is conscious, coughing, and breathing, he should be sent directly to a hospital or doctor. If he is unconscious and no breathing is detected, it's time for you to do something. Don't wait until you can get the victim out of the water. Mouth-to-mouth resuscitation should begin at once, even in the water. If you can't feel the carotid pulse (in the neck), then external cardiac massage should begin. If there are two people to work on the victim, one should do the massage and the other should do the resuscitation. If you are alone, you should alternate between resuscitation and massage. Three mouth-to-mouth breaths of 5 seconds each should be followed by 15 quick, firm strokes of pressure from the heel of the hand on the sternum or breastbone at about one second intervals. As soon as oxygen equipment is available, intermittent positive-pressure breathing with oxygen should be started. This should continue even after the victim begins to breathe on his own. The cardiac massage can stop when the carotid pulse is detected. Every swimmer should know mouth-to-mouth resuscitation. Make certain everyone in your family knows the method. Armed with this knowledge, you'll enjoy you swimming much more this year.

SHARKS — Continued

10. There is no known reliable shark repellant.
11. Whistles, bangs, and noises don't provide any protection and don't usually scare sharks. Some experts feel such sounds are simply a call to "dinner."
12. If you catch a shark while fishing, don't try to land it or boat it if you have not experience. Boating a mature shark may provide some unpleasant surprises.
13. Sharks do not have to roll over to strike, as once believed. Neither do they need to circle before an attack. Almost all surviving victims of shark attacks say they never saw him coming. Sharks will attack from underneath most often but not exclusively. Sharks will tend to one swimmer in a group and often ignore others even if the others try to rescue the isolated swimmer. Nothing they do is predictable to the point of providing any comfort to the swimmer or diver.
14. If you are attacked, you must become the aggressor and hit the shark on the nose, eye, or gill with any tool you have. As it passes, move away from the tail which can also cause damage. Being aggressive has, at times, caused the shark to leave the scene and retreat for reconsideration.

When Fishing

1. When your clothes are saturated with bait smell, don't walk too far into the surf.
2. Successive casting of line and plug jerking will attract sharks near the surf.
3. Fish or entrail saturated clothes in water will attract sharks.
4. As mentioned before, don't try to land a shark if you are alone or inexperienced.

When Surfing

1. Don't surf after a cut is received.
2. Don't lie on surfboard with arms or legs dangling over the side.
3. Don't surf alone, after dark, near a pier, or in very cloudy water.
4. Don't surf in areas where sharks have been recently sighted.

When Swimming

1. Don't wear *any* jewelry, including hair barrettes, earrings, chains, etc.
2. Irridescent nail polish may look like frosting on a cake to a shark.
3. Don't wear silver or gold swim suits.
4. Don't swim during your menstrual period or with cuts, wounds, or sores.
5. Wild kicking or dog paddling in the ocean will make you look like a struggling fish and very attractive to a shark.
6. If you cut yourself, make a tourniquet with anything you can and get out of the water as soon and as smoothly as possible.

When Diving

1. Don't use chrome covered or very bright diving gear.
2. Don't trail specimen bags.
3. Swim smoothly.
4. Start ascent before you are under 500 PSI so you can afford to slow down if you see a shark.
5. Follow *all* the rules of diving, particularly the rule which tells you never to swim alone.
6. Remove speared fish immediately.

Use Your Head

If you use your head you can keep your hands and feet this summer. The "show-off", the "know-it-all", the over confident, the careless, the loner, and the dead may all be in the same group. Just follow the rules and your summer will be safe.

FISH DON'T LIKE BOLOGNA

Often times during the past few years, proposals have comes forward recommending the deep ocean as an ideal site for the disposal of organic wastes. It may still prove to be a good idea, but not for the original reason intended. It turns out that the deep ocean has a remarkable ability to preserve organic materials far beyond elaborate refrigeration techniques and much beyond what anyone had believed. The secrets of preservation began to emerge recently when six bologna sandwiches, two apples, and two thermoses of bouillon were recoverd after 10 months at a depth of 1540 meters. Scientists Jannasch, Eimhjellen, Wirsen, and Farmanfarmaian reported in a recent issue of Science that the lunch for a three-man crew was recovered in near-perfect condition from the Alvin, after having spent nearly a year on the deep ocean floor. The Alvin, a research submersible from Woods Hole, ungraciously sank in October 1968. The three man crew got out but the lunches remained and settled to a silent domain nearly 5000 feet down. In September 1969, the Alvin was brought up and among the many surprises was the near perfect preservation of the three lunches. The six bologna sandwiches appeared fresh to sight, taste, and smell. The meat was still pink in the center. With subsequent surface refrigeration, it all spoiled rather quickly. The two apples showed no signs of decay although they had a slightly pickled look. The containers of soup were in perfect condition. The evidence clearly indicated that deep ocean degradation is up to 100 times less than shallow water degradation.

The data was compared with subsequent controlled experiments and all showed a general slowdown of all life processes in the deep sea. The secret appears to lie in the temperature-pressure relation in microorganisms in deep water. Direct biological changes are extremely difficult to detect directly in the deep sea environment. Consequently, it has been speculated that the increased hydrostatic pressure may exert an effect on the cells, and raise the minimal growth temperature. When this temperature exceeds the environmental temperature, the cells become inactive. When this happens, we approach perpetual preservation.

The implications are profound. Certainly garbage or organic waste will deteriorate faster on land or in shallow water. In the deep ocean, such wastes could be preserved for perhaps 100 years. By placing organic material in the deep ocean, we are thereby disrupting the natural recycling and we are taking nutrients out of the basic life cycle. There are now arising some basic questions about the feasibility of artificially fertilizing or adding nutrients to the sea by deep ocean dumping. The answers may be a long way off.

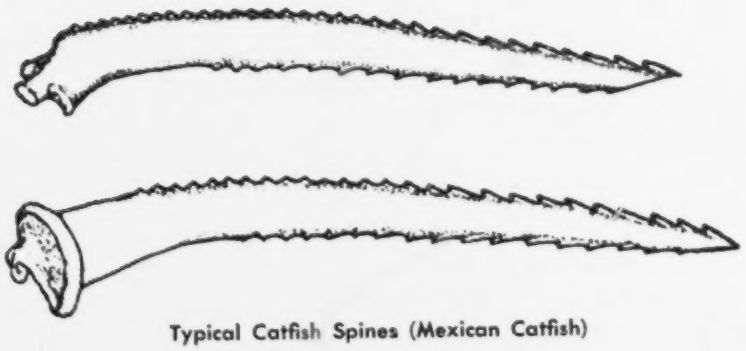
In any event, the food found preserved at 5000 feet, 150 atmospheres, and 39°F points to the "slow down effect" with little uncertainty. Now we can expect to see proposals for the artificial storing of perishables (foods and drugs) in the deep ocean areas. Giant food surpluses no longer need be allowed to spoil. Some day we may even see human volunteers for preservation experiments.

* * * * *

HYPERBARIC MEDICINE

Hyperbaric medicine refers to medical treatments involving high pressure chambers. The many special diving, decompression, or test chambers around the country can be used to create an environment of several atmospheres of pressure. Under the high pressures, which are equivalent to deep dives at sea, breathing gases are forced into the bloodstream. Doctors can take advantage of this infusion in treating certain medical problems.

One case in point is Mrs. Shirley Smith in San Diego. She has developed a lingering chornic infection in her stomach. The responsible bacteria somehow survives only in the absence of oxygen. Doctors decided to use a local decompression chamber and treat Mrs. Smith as though she had the "bends". She was put in the chamber and pressurized to a simulated depth of 60 feet with 3 atmospheres. The breathing gas was pure oxygen which is forced into the blood to the oxygen saturation point. Normally, oxygen is only 21 percent of a divers air but for Mrs. Smith, the oxygen enrichment was required to kill the bacteria. This same technique has been used to support skin grafts and save nearly-severed limbs in other medical treatments. Mrs. Smith only has a little time to spend in the chamber since oxygen toxicity becomes a danger. Oxygen enrichment beyond a certain point can cause damage to the brain and to the senses. The treatment involves the facilities of the Navy's Undersea Research and Development Center in San Diego. As we learn more about high pressure environments and high pressure medicine, we may open a whole new avenue of medical research and pursuit. There may be some new answers to some old questions.



Typical Catfish Spines (Mexican Catfish)

SEA CATS

Catfish come in an endless variety of sizes and shapes. They are even found in franchise restaurants. The only consistent characteristic is that they have no true scales. Their leathery skin is thick and slimy. Some are covered with bony plates. The ones we want to talk about are the ones you must handle with care. In front of the soft-rayed portion of the pectoral and dorsal fins can be found a single, sharp, sturdy spine. This spine is enveloped in a thin layer of skin which appears as a continuation of the soft-rayed portion of the fin. The spine has a series of curved teeth or serrated edges which can produce a deep, severe laceration. The catfish can, at will, extend and lock the spine rigid. Victims of the cat usually grab the fish with a hand to remove a hook and end up with a spine completely through their hand. Other victims will step on the fish on the bottom or boat deck to hold him while the hook is removed. Piercing a sole of a shoe usually presents no problem for the cat. Even out of water for a time, the cat should be handled carefully.

Some of the cats are venomous. The venom cells lie in the sheath that surrounds the spine. The effect is the same as if the spine were dipped in venom.

The pain will be instantaneous and scalding. The area around the wound will first pale and then become blueish. Next, comes redness and swelling. Numbness follows and perhaps some shock. Gangrene and secondary bacterial infections are the main hazard. Catfish stings may take weeks to heal so take care in handling the cats you catch. This will make the catfish eating even more enjoyable.

* * * * *

DANGER — SPEARS

Every state has strict rules on where you can spear fish, when, what kind of fish, and what kind of spears. Be certain to check local regulations before taking any spear into the water. If you are in an area where lots of snorkelers and divers have spears, stay clear of everyone. A careless spear fisherman may find you an unwilling target. Always survey the water area you are in for boats, fishermen, and particularly, for spears.

JELLYFISH—NOT SO HARMLESS

Marine invertebrates that populate coastal waters have long been a source of wonder because of their many forms and colors. Those who have not ventured into the surf and shallow pools may not know that some of these invertebrates can cause serious injury or even death in extreme cases. The culprit we want to talk about is the jellyfish. Most jellyfish are small in size and have limited tentacle growth and hence do not bother man in the water. There are species and relatives of the jellyfish that can produce painful and severe effects. With some of the less toxic species, a minimum effect might be a breakdown of the blood cells in the person being stung. As the toxicity and extent of the contact with the tenacles increases, lesions appear. A single tenacle can produce multiples lines of wealing with a fringing flare of reddening tissue. On top of the welt one can often find a pattern of transverse bars which correspond to the patterns of the stinging cells on the tenacles. The imprint comes from the localized death of living tissue. Skin color can turn red, then brown and purple, with the discoloration lasting for six months. In light cases such as these, permanent scarring is unlikely.

Contact with larger specimens or a greater length of contact (inches of tenacle) with even a small jellyfish cause more severe pain and drastic effects. Local edema can be massive. Fluids ooze out beneath the seared lines of tenacle contact and raise blisters a half inch in height. Cells are killed deep into fatty subcutaneous tissue with a resultant slow healing and permanent scarring. In some cases, itching and infection has persisted for many years.

Proper treatment can bring about dramatic relief and minimize injuries. We will discuss recommended treatments later, after we first explore the peculiar life and behavior of the troublesome invertebrate. It is only fair to caution that some species can cause death, although it is not common. With few exceptions, the deaths have occurred in shallow waters when a jellyfish was contacted by a subject while running, swimming, jumping, or the like. Involvement is usually great before separation from the animal is possible. Over 20 feet of firm tenacle contact can easily result from one of these extensive encounters. The lower limbs are usually involved first, and the subject is tripped up and the entire body comes into contract with the tenacles. Pain is instantaneous and severe. In some cases, collapse occurs within a few minutes, followed by a few deep breaths, some violent twitching, and death. Many have suggested that serious injury or death can be attributed to a constitutional or organic weakness in the subject. While this appears to play a role, it cannot be considered the complete explanation. In any event, only one or two species are suspected to be toxic enough to produce such drastic consequences, although caution is urged with all. There is evidence that up to 30 feet of tenacle involvement has been experienced without large systematic effects in some cases.

THE STING

Any diver who has been stung by a jellyfish has probably wondered just what happened. A better understanding of just how the sting occurs provides a better appreciation of the potential danger of the sting and the even greater danger of improper treatment.

Along the tenacles of the jellyfish are formed numerous epidermal cells called cnidoblasts. Within these cells form special cells for stinging. These special cells are called thread cells, nettle cells, cnidae, or nematocysts. The cells are elongated with a tube-like structure at one end inverted into the body of the cell. Within the tube is a fine hair called a cnidocil or discharge thread. The thread is folded in helical pleats inside the tube. The thread itself is only a few microns in diameter. Each tenacle has a covering of these cells which it uses for both offense and defense. When the discharge thread is contacted (by food or diver), or when there is some form of electrical stimulation beyond a threshold set by a complex nerve network in the jellyfish, the discharge process begins. There is initially a great increase in intracapsular pressure. The thread wall swells, and the nematocyst cell seems to be turned inside out, and fills with water. The discharge thread is thrust outward about three times its normal length. The thread has enough rigidity to pierce the prey and inject a toxic fluid. The whole procedure suggests an explosion of the cell. Once discharged, the cell no longer functions or regenerates. In a typical contact, only a small percent of the available cells are actually exploded. The others seem to remain intact for subsequent use, which suggests great care in removing a jellyfish, even when apparently dead.

The toxic fluid is much like formic acid. The contents are largely toxic proteins. Within the protein structures have been found hydroxyproline, glycine, tyrosine, arginine, analine, and assorted combinations of amino acids. The real toxicity appears to be confined to a few of the peptides in the amino acid groups. The specific protein breakdown varies considerably from species to species.

If the jellyfish is on the offense, the tenacles will wrap around the prey or hold onto the subject while an attempt is made to ingest the object stung. If the jellyfish stings out of defense, no added tenacle involvement is likely without the subject struggling.

JELLYFISH HABITS

We have now met the jellyfish and his sting. His habits are really quite simple and predictable. They seem to be everywhere, all the time; but, generally, they move in oceanic streams, since they prefer low salinity and warm currents. If a stream reverses or slackens, the jellyfish can drift in toward shore. The most common attraction to the jellyfish is a fresh water runoff. Just after heavy rains, the runoff is large and the coastal salinity drops. Small crustaceans become plentiful in the slightly warmed, fresh water. Shallow pools can become discolored from the crustaceans. The jellyfish will quickly sense the favorable condition and drift into these areas with distended stomachs and extended tenacles. The beaches are usually approached in calm, flat conditions, even though salinity and temperature conditions are favorable. The jellyfish have a remarkable ability to sense turbulence and waves, and carefully avoid disturbed waters. It is actually rare to see healthy jellyfish stranded by wave action. When the water gets rough, they seem to dive deep or just disappear. Researchers believe that there is a keen frequency sensitivity among jellyfish. Divers and swimmers may some day be able to use acoustical signals to scatter the troublesome jellyfish. In general, watch out for calm, warm water after a rain runoff.

THE TREATMENT

The practical question deals with what to do if you are stung. If you happen to be in the South Seas, you might do as the natives do — apply the juice of papaya liberally immediately after being stung. The magic ingredient is papain in the juice. Some alert divers have noted that commercial meat tenderizer contains papain as its key enzyme ingredient. An affected area can be treated with a solution of tenderizer and subsequently washed a few minutes later. The action of the enzyme is almost instantaneous in attacking the toxic cells.

The most useful first step is to apply a fixative (alcohol: 50-90%, methylated spirits, or formalin: 10%). If none of these are available, dehydrating compounds such as salt or sugar can help. A third round choice would be fine dust, talc, flour, or even hot sand if nothing else is handy. After the fixative has been applied or the dehydrating substance adheres to the tenacles, scraping or lifting should begin. A knife or stick can be used to lift or scrape off the remaining tenacles. Great care should be taken not to pluck, rub, or unnecessarily

DANGER - RIPS!

"Rip Tides" is the name given to dangerous currents known to carry swimmers out to sea and perhaps to their death. The name needs clarification as does the phenomenon itself since we are in the season most treacherous for swimmers.

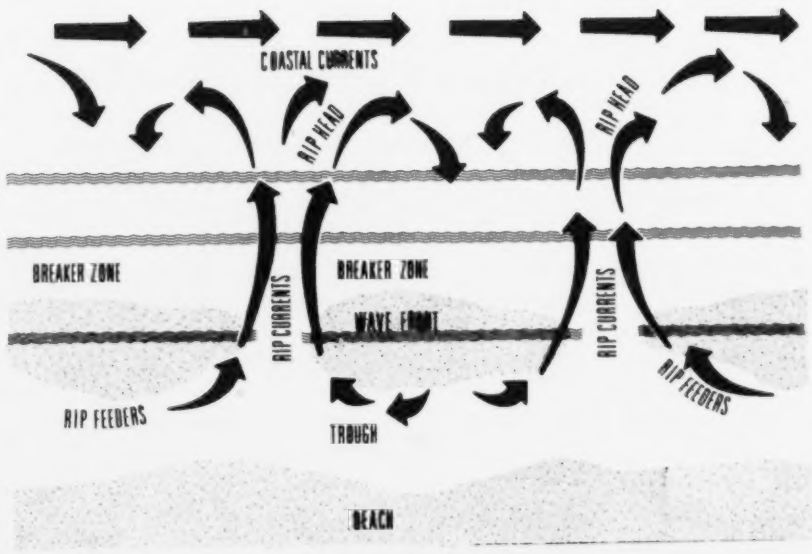
TIDES

Generally, "tides" refer to the vertical movement or change in height of a given local sea level. The movement of the water is attributed to astronomical, hydrological, or meteorological factors. As the tides rise and fall, the water level must make a vertical adjustment resulting in the inflow or outflow of water with respect to the shore. The flows or adjustments for tides are known as "tidal currents." Since the tides are cyclic, so too are the tidal currents. The cyclic or periodic nature may show as a reversal in direction or as an elliptical rotation in a shore area. Tidal currents differ from ocean currents in that they don't result in any permanent or semipermanent transport of water, as do other currents. The periodicities of tides and tidal currents has brought about a special set of terms. The movement of the water toward the shore is the "flood." As the water flows out to sea, we refer to the "ebb" of the tide. The period around the peak or depression of the tide is the "stand." The absence of horizontal movement is referred to as the "slack." The direction of the current flow is the "set" and the current velocity is the "drift." Armed with all these terms, we can explore the "rip tide" mechanisms and find a better name for them.

RIP TIDES

Henceforth we shall drop the term rip tides and call them "rip currents," a more accurate term used in oceanography.

Rip currents form when waves break in rapid succession on a shallow underwater bar. As the waves break, their onshore momentum greatly increases the water transport phenomenon and water cannot return or escape between wave crests. This "piling up" of water can quickly raise the water level in the breaker zone three feet above the level outside the breaker zone. As we know with the tides, the vertical change in height results in a horizontal flow of water. Such is the case when sea levels rise in the breaker zone. A current is created which starts a "set" parallel to the shore and then turns seaward. As it flows a channel is created out through the breakers to the sea. The laterals, or flows parallel to the shore, are called rip feeders and the flows in the channels are called rip currents. The channels are usually fed from two sides. Rip current "drifts" average one foot per second but frequently reach three to four feet per second. The velocity is constant from the surface of the water to the bottom of the rip channel except for minor surface variations on the bottom. The high velocities create a channel one to two feet deeper than the surrounding bottom and the resulting currents run out as far as 1,000 feet past the breakers. At these distances the coastal currents disperse and dominate the rip currents.



RIP DURATION

Rip currents seem to run in spurts of several minutes. After a series of large waves the rip currents start to form. When the water levels on either side of the breaker zone become nearly equal again (two to four minutes later) the rip currents start to diminish. The cycle will repeat with the start of the next wave series.

SPOTTING RIPS

Since the rip channel is a foot or so deeper than its surrounding, waves rarely break in the channel. Also, since the "set" of the rip currents is against the wave direction, the wave velocity increases. This localized increase in the channel causes an instability in the waves and small spilling breakers should be visible in the channel. The rip channel may also appear to have short steep waves as characterized by a wind chop. Watch the waves before you enter the water. Watch for *at least five minutes*. The waves will generally break where you find the shallow underwater bars. The appearance of light colored foaming water should indicate a shallow area. Dark colors indicate depth. If you see a channel with a chop and noticeably smaller waves, stay out of the area. If you get caught in the rip current, NEVER SWIM TOWARD SHORE. SWIM PARALLEL TO THE SHORE TO GET OUT OF THE CHANNEL. Remember, the rip currents can run a 1,000 feet beyond the breakers.

UNDERTOW

The dictionaries say an undertow is a subsurface flow that sets seaward when waves break on shore. Generally, if the underwater bars are shallow, the rip currents will provide the water return mechanism. If the bars are relatively deep (4-8 feet) there is likely to be a weak bottom return or undertow under the waves. This water return is not considered particularly dangerous. It is difficult to imagine an "undertow" capable of "pulling a man under". A swimmer may be hit by a wave and, when he regains his feet is again knocked down by the backwash. However, the wave and backwash aren't simultaneous as in the case for the undertow. A frightened surfer could panic and become disoriented but it won't be the undertow which causes the trouble.

Nearly 75 percent of the annual surf rescues take place in the ten week interval starting April 1. Ninety-five percent of these rescues will be rip current rescues. These rescues and the occasional drownings can be avoided by watching the water before you go in.

- *Watch* for calm gaps in the line of breakers.
- *Watch* for a peripheral line of foam and debris.
- *Watch* for yellow-greenish water with suspended sand.
- *Watch* for a foamy or choppy channel leading out through the surf.

Avoid disaster before you're part of it.

---

agitate the tenacles, since further stinging will almost always result from nematocysts as of yet undischarged. Fresh water should be avoided on the area until a fixative is applied. After the fixative, a shower can be taken and topical anaesthetic creams applied. A doctor should be seen as soon as possible since more potent analgesics may be required. Medical attention is also recommended because of possible serious lymphatic obstruction. There is little danger if you examine the water before entering, avoid the jellyfish, and rapidly practice first aid treatment when a sting occurs. It cannot be overemphasized that the jellyfish or jellyfish tenacles should be removed with a slow lifting motion. Even jellyfish apparently dead on the beach are capable of stinging the unsuspecting swimmer.

Take care this summer.

YOUR SUMMER AND BOATS

This summer you may find a great amount of pleasure with some form of boating. Most everyone who lives or ventures near the sea will have an opportunity to ride in or sail one of the growing family of American boats. There is no reason why this recreational boating should be anything but fun. Yet, serious accidents occur in increasing numbers, primarily because ignorance and carelessness can turn ordinary situations into hazards on the water. The oceans can be our greatest recreational asset if we make an attempt to understand it, stop polluting it, and follow some simple rules. Our Newsletter has labored the first two points for years. Now, we'd like to pass on a few well-known and well-accepted rules of boating. It is our sincere hope that these rules can keep misfortune out of your boating experience on the American waters this summer.

RULES AND LAW

There are numerous local, State, and Federal regulations governing boating. If you own a boat you must learn the rules. Even if you don't own a boat but plan to use one, this means you still must comply with all the regulations and should be even more careful because of your lack of experience.

At the Federal level there are two main acts: The Motorboat Act of 1940 and the Federal Boating Act of 1958. The distinctions aren't important here, but the consequences are. These two acts govern every boat or vessel from bathtubs to the high seas. They specifically define required equipment, operations, registration, licensing, numbering, safety procedures, and penalties for violations. In addition, individual states have laws governing the use and regulation of everything from surfboards to ocean-going vessels. You must even be aware of local regulations governing water entry and exit, dumping refuse, size and power limits, and area restrictions. We will cover some highlights and the last paragraph will tell you where to get more information.

CLASSES

A motorboat is any vessel powered by machinery and less than 65 feet long. The classes used in regulations are as follows:

Sail or non-powered boats.
Class A: Less than 16 feet.
Class 1: Over 16 feet, less than 26 feet.
Class 2: Over 26 feet, less than 40 feet.
Class 3: Over 40 feet, not over 65 feet.

We'll restrict our comments to sail boats, Class A, and Class 1 boats. If you are on or operating a Class 2 or Class 3 boat and don't already know the rules we'll discuss, you are in trouble or you're a fool.

LIGHTS

Class A and Class 1 boats must carry the following lights between sunset and sunrise.

Aft: A bright light must be shown aft. The light must be higher than other lights onboard and be visible around the entire horizon. Two mile visability is required.

Sides: A combination light is required forward which shows red from dead ahead to two points abaft the starboard side and green from dead ahead to two points abaft the portside. These lights should have one mile visibility. When sailing, you should always remember that laying a boat over often obscures the lee light.

Sailboats come under a greater number of rules and the night operation requires even greater vigilance. For sailboats under 26 feet, the aft light should be a 12 point light, the red port and green starboard lights should be 10 point lights. Local Pilot Rules govern and should be consulted. The term "point" means 11¼°; so a 10 point light covers 112.5°, and a 32 point light covers 360°. Smaller boats, like rowboats, must show a white light in the night when approaching another vessel. Check your local Pilot Rules and the regulations for your size and type of boat. Smart sailors carry a spare bulb and/or a fuse. When under power, the sailboat must comply with motorboat light requirements.

Bells and Whistles

For Class 1 boats you should have a hand, mouth, or power operated whistle or horn audible for ½ mile. This whistle must be capable of a 2-second blast for passing and signaling. Smaller boats don't require a whistle.

Life Preservers

A Coast Guard approved life preserver, buoyant vest, ring buoy, or buoyant cushion is required for every person onboard or being towed. Make certain you can get to the life preservers in a hurry.

Distress Signalling

A waterproof flashlight is a minimum requirement. Small battery operated searchlights and approved distress flares are recommended. Check with your local boat supply store.

Fire Extinguishers

For Class A and Class 1 boats, with inboard power primarily, a portable, hand fire extinguisher is required. Make certain it is up-to-date, full, and accessible. There are A, B and C types extinguishers. Class A and Class 1 require B-type or foam extinguishers.

These are best for engine or fuel-related fires. Plain water may be best for fires in wood, alcohol, bedding or paper. For this reason, keep a bucket or bailer on board. Stern driver and inboard systems must have flame or backfire arresters. Many fires have been started because of the lack of flame arresters. Check you state laws for special restrictions.

Numbers

Each state will generally require a Certificate of Number or numbers on every vessel with a 10 horsepower or larger engine. The color, size, shape and location of numbers will be specified by each individual state. Their Certificate of Number should be carried on board. In some area, both state and U. S. Coast Guard numbers are required. Check with your local boat shop if you have any questions.

First Aid

All boats should have first aid kits to take care of cuts, burns, sunburn, bites, stings, splinters, etc. Check the kit before you leave the dock or shore. There are a variety of approved kits or lists that let you put together your own kit. Make certain everyone on board knows where the kit is. We not only recommend that everyone on your boat know how to swim, but also know how to administer artificial respiration. We recommend that you briefly review the mouth-to-mouth procedure with each person on board. There will be no time to look it up if a drowning occurs.

Water Skiing

Don't tow a skier who can't swim well. Make certain all skiers wear belts or vests. When you pull a skier, you must have a wide angle mirror, or preferably, a second person sitting in the boat facing the skier. When picking up skiers, approach them from the lee side and turn off the engine. Try to take them aboard over the stern on smaller boats.

Review carefully all basic hand signals with skiers before departing.

Food and Water

Most boats carry some food and water for emergencies. It is highly recommended that at least some fresh water always be carried on any size or class of boat.

Pumps

No boat should be without a hand bailer or bucket. Pumps are preferred but not usually necessary for small boats.

Miscellaneous Items

A paddle or oar is recommended for extra precaution. A boat hook and fender may also be desired.

Weather

It seems a great percentage of disasters are brought about by inexperienced sailors operating in difficult or hazardous weather. If you lack experience in rough weather, stay off the water. Check the forecast, sea state, boat warnings and your experience. Don't stay on a lake in lightning conditions. Go ashore immediately. If you have a radio, there will be a channel devoted to weather. Take the time to get an accurate assessment and take precautions in small boats. If you are in doubt, ask someone.

Float Plan

Along with a check list for each departure, you should prepare a float plan and notify a friend or neighbor of your plan. This notification should also include a description of the boat, the number, and estimated arrival or return time to make search easier should a search be necessary.

Licenses

Normally, no operating license is required for boats under 300 Gross tons and not carrying passengers for hire. On the open sea, the limit sometimes drops to 200 Gross tons. If passengers cost share expenses, pay fares, or otherwise pay their way, the boat operator must be licensed by law, regardless of the size of the boat. Without paying passengers and under 300 Gross tons, boats under 65 feet require neither a licensed pilot nor a licensed engineer. The Coast Guard regulates all licenses. You should check with your district Coast Guard office for any questions. Since most boats under 65 feet have no licensed operator, extreme caution is urged on inland waterways, in approaches and passing, and in close operations. You can assume the other guy doesn't know signals, signs, flags, or etiquette. It is best to operate your boat defensively at all times.

Flag

Learn your ships flags and fly them proudly. Learn to recognize distress flags and scuba diving flags. They exist for someone's safety and should be respected.

Refuse

Please don't throw trash overboard, particularly in harbors, canals, rivers, lakes, etc. Plastics can kill fish and don't readily break up or dissolve. Boat enthusiasts say they can navigate in many areas by following trails of trash at sea. Think what you are throwing over and stow it. It is sad indeed to find an ocean of plastic cups 20 miles from shore. The ocean isn't infinite so please take a litter bag along.

Organizations

There are several nation wide organizations devoted to safety and education of recreational boating. You should give membership serious consideration. *The United States Power Squadron* is one of the oldest. There are 370 local squadrons and 75,000 regular members. Their training and inspection efforts contribute greatly to boating safety. *The United States Coast Guard Auxiliary* is also a safety and education group. They specialize in search and rescue operations and serve as models of boating safety. The other associations which publish and promote standards and regulations in boating include the American Red Cross, the American Boat and Yacht Council, the Yacht Safety Bureau and the National Fire Protection Association. It generally pays to belong to some local chapter or boating group. If you are going to race, the North American Yacht Racing Union will set standards for boat and crew. Compliance is essential to prevent disqualification.

Reference

There are many good books on boating and most of the organizations mentioned above have publications. The basic reference or boating bible is called *Piloting, Seamanship, and Small Boat Handling by* Charles F. Chapman. The publication is sponsored by *Motor Boating* magazine. If you plan to do much boating you should own Chapman's book.

Good Wishes

Enjoy your boating this year. Try to become familiar with all the regulations and don't take chances. Watch the water for swimmers and divers, check your fuel and the weather before leaving, and follow the rules mentioned earlier. Make your summer boating incident free and memorable.

ATTENTION TREASURE SEEKERS

Most states have some form of antiquity law that affects what you collect on the shore or at sea. There are three mile limits and ten mile limits No two laws are the same but some general advice can be given here. If you find something on the beach or at sea that has historical, archeological, educational, scientific, or commercial value, don't try to keep it without a license or permit. In many cases it is up to the state affected to decide what artifacts or marine items should be included. In general, anything of value is protected at sea. You need a license or permit to collect almost everything. Check your individual state regulations. Also, intertidal pools are often completely protected. Look for coastal zone laws, antiquity laws, or conservation laws in the area you will spend some time. If the species you want to collect is protected or you think it is, then leave it. Never take any item from a wreck or sunken ship regardless of condition. Heavy fines await the unauthorized collector. Look and ask before you collect.

CUT ALONG THIS LINE

APPLICATION FOR MEMBERSHIP
AMERICAN SOCIETY FOR OCEANOGRAPHY
1900 "L" St., N.W. • Washington, D. C. 20036
(Non-profit, tax-exempt)

Date_____ Birth Date_____
Sex_____

I, _____, hereby apply for membership (check one) in the American Society for Oceanography. (Check enclosed)

☐ Regular, Annual—$10.00 ☐ Sponsoring, Annual—$25.00 ☐ Life, Total—$250.00 ☐ Benefactor, Total—$1,000.00

Home Address_____ Phone_____

City_____ State_____ Zip Code_____

Business Address_____ Phone_____

City_____ State_____ Zip Code_____

Address Mail to Home ☐ Business ☐

Occupation_____ Employer_____

Area of primary interest in oceanography:_____

Don't Step On A Ray

In our coastal waters around the United States we have eleven species of sting rays and nearly all can present a problem. The sting rays have a flat, shovel-shaped body and a long tail. In the tail are one or more sharp, long spines. These spines are occasionally thrust into the leg or foot of a careless swimmer or diver. We are going to discuss what can happen if you should be this swimmer and what steps you should take.

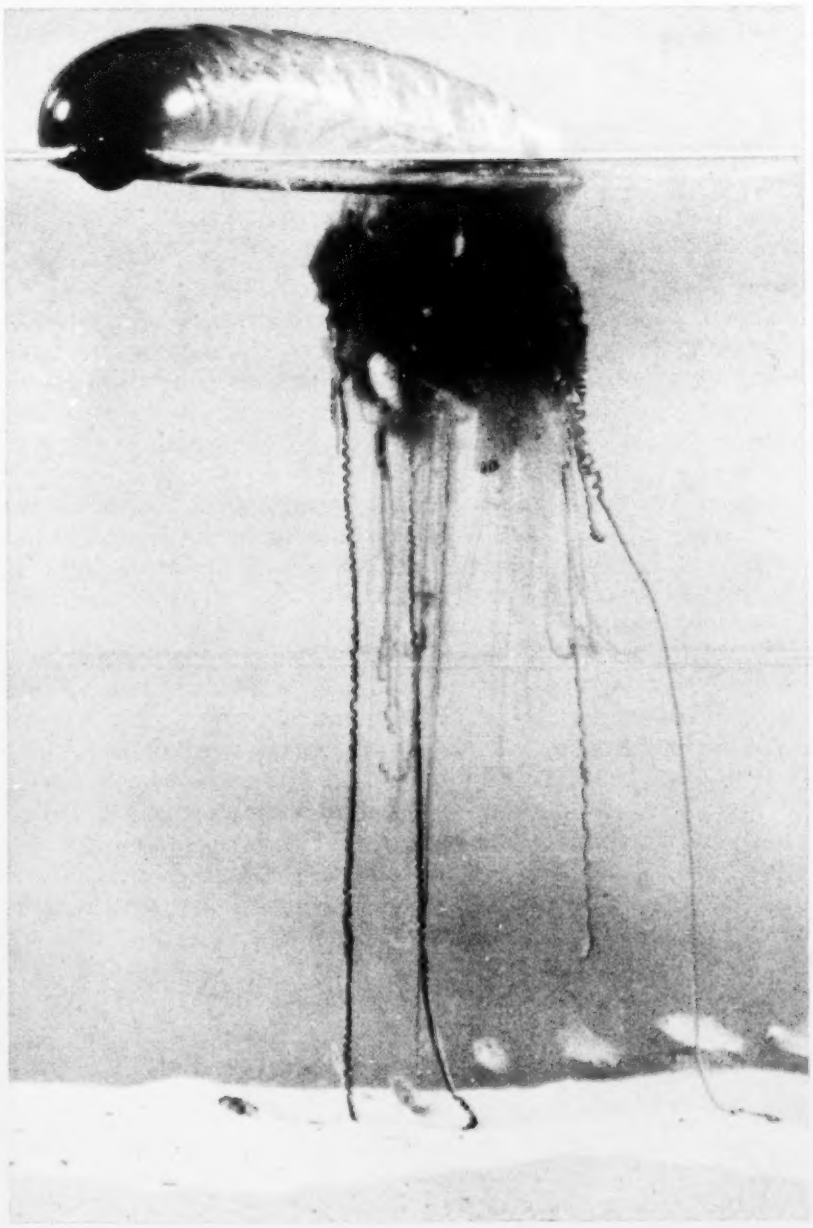
The sting ray is usually found swimming over reefs or over sandy bottoms in shallow, warm water searching for fish, mollusks or crustaceans to eat. If not eating, the rays partially bury themselves in the sand. An unsuspecting swimmer or diver can easily step on the ray since he is nearly invisible under the thin sand covering. Sometimes a swimmer will stir up the water and sand and the ray will rise. Then, being frightened, our careless swimmer will kick his feet at the ray. Either stepping on or kicking a ray can produce the same disaster — a sting.

The wound can be large and irregular or jagged because of the size and shape of the serrated stinger. As the stinger is driven into the flesh, the venom is literally injected into the victim through a small sheath in the stinger's core. Pain is immediate and often produces a scream. Numbness follows in the area of the wound or the whole extremity. Nausea, vomiting, dizziness, headache and respiratory stress can also follow. Maximum pain seems to occur between 30 and 90 minutes after the attack. Shock will be one of the biggest problems to face.

The victim should be removed from the water immediately and the wound washed with sterile saline solution or cold, clear water. Any pieces of the stinger or sheath should be removed. A 30 minute soak in plain, hot water or hot compresses is helpful since the heat is supposed to denature the protein venom. Most marine poisons seem to be of the protein type. For large wounds, a doctor should be called.

The steps a doctor will take will depend on the shock or trauma of the patient and the specific nature of the wound. Dr. Patrick Mullanney writes in Skin Diver magazine of typical treatments. To relieve pain, he has used 30 mgm. of pentazocine lactate intravenously and the same dose intramuscularly. Relief should be immediate. The area of the wound is usually then treated with 2% lidocaine for a topical anesthetic. Dr. Mullanney stresses the importance of removing any remaining foreign material or remains of the stinger. Irrigation will then be performed to avoid the subsequent formation of shallow ulcers. These ulcers will cause great discomfort and are very slow to heal. In treating the protein venom directly, it has been found that the antibody — antigen reaction releases histamine, so the patient is given an antihistaminic compound intramuscularly and orally. Caution is in order because of potential hypotensive properties of antihistaminic compounds.

Because of the protein excess that is likely, Dr. Mullanney's patients are given methyl prednisolone sodium succinate. Also, a tetanus prophylaxis is recommended along with an oral analgesic.



Portuguese Man-of-War

We all hope you don't become one of the victims of the sting ray this summer. You should follow two suggestions. Walk with a shuffle in shallow, sandy waters. This will almost always chase the sting rays away and avoid any contact. Next, don't kick at fish, particularly sting rays. Just quietly swim away. Knowing the hazard should avoid an incident. Be watchful.

American Society For Oceanography

Dr. Robert W. Howe
Eric Information & Analysis Ctr.
for Science & Math.Education
1460 West Lane Ave.,2nd Flr.
Columbus, Ohio 43221

NON-PROFIT ORG.
U. S. POSTAGE
PAID
PERMIT NO. 8573
HOUSTON, TEXAS